Space Weather Forecast

Issued on Monday, 04 April 2022 at 13:19 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Decreasing risk of Minor/Moderate radio blackouts. A geomagnetic storm (G1-G2) is likely on Day 3 (6th April) due to the arrival of a CME.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low over the past 24 hours. The largest X-ray flare of the period, originated from AR2976 in the northwest quadrant, near the western limb, peaking at middle common-class flare, observed at 03/1309UTC. There are now five sunspots on the visible disc, with the recent most active group, AR2975 now rotated over the western limb along with AR2984. In addition, AR2982 faded to plage in the eastern hemisphere. This has left the main frontside groups as AR2978, an Ehi/Beta, with minor intermediate spot development and spreading. All other groups were unipolar nd unremarkable. AR2974 is about to rotate off disc.
There remains numerous large filaments (arcs of plasma) on the disc. The most notable event of the last 24 hours was the lifting off of a large filament in the southwest quadrant, at 03/1600UTC. This event produced a coronal mass ejection (CME) which was observed in coronagraph imagery and has been analysed. This shows an Earth-directed CME arriving sometime on Day 3 (6th April).

No other Coronal Mass Ejections (CMEs) were visible in available imagery.

Solar Wind / Geomagnetic Activity: The solar wind, as measured by DSCOVR at L1, showed a gradual decline in many solar wind measures in the period, perhaps indicating an exit from negative polarity high speed stream influence and perhaps also residual CME effects. The solar wind started the period at slightly elevated levels, near 450km/s, before a sudden rise to elevated levels, with a peak of 531km/s at 03/1445UTC, before a gradual decline back to the slightly elevated levels, near 460km/s, by end of the period. The cause of this resurgence is uncertain, however the effect on geomagnetic activity was slight. Whilst the cause of this is uncertain, it may be a close pass from the 31 March moderate-class flare CME from AR2975, as this is indicated in MOSWOC modelling as narrowly ahead of Earth in the track of its orbit.
The number of particles comprising the solar wind and their associated magnetic field were both unremarkable and within typical background levels. The net result of the above solar wind measures was mainly quiet, well below Minor Storm G1 throughout.

Energetic Particles / Solar Radiation: Solar radiation showed a continuing gradual relaxation towards background levels, having reached S1/Minor Solar Radiation Storm on the 2nd April. This was in the wake of an moderate class X-ray flare from the northwest of the sun on Saturday 02 April.

Four-Day Space Weather Forecast Summary

Solar Activity: The chances of further significant flares should soon reduce into the new working week, as the northwestern sunspots leave the Earth-facing side. Activity should be predominantly low, with a much-reduced daily chance of moderate-class flares.

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Solar Wind / Geomagnetic Activity: An exit from the current fast wind is expected during Day 1 (4 April), with no further coronal holes forecast and mainly Quiet activity. The large filament eruption from the south centre disc on the 3rd April launched a CME, which has been analysed, and is Earth-directed, with an expected arrival sometime on Day 3 (6th April). This is likely to enhance geomagnetic activity, which will initially be Quiet, but increasing to Unsettled to Active, with a G1-G2/Minor/Moderate geomagnetic storm likely on Day 3 (6th April) and possibly into Day 4 (7th April). However, analysis of the 3rd April CME will undergo further analysis, so timings may be refined.

Energetic Particles / Solar Radiation: The risk of further solar radiation storms should now slowly reduce as the northwestern sunspot regions rotate off the Earth-facing side of the sun.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	5	70	30
Strong	G3	No	1	1	10	5
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	40	25	25	25
Very Active	R3 to R5 X	No	5	5	5	5

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Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	15	10	10	5
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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